

CLAIMS

What is claimed is:

1. A composition comprising:
a macromer prepared by reacting an unsaturated diacid having a carbon-carbon double bond and a saturated diacid; and
a bioactive ceramic grafted to the macromer.
2. The composition of claim 1 wherein:
the unsaturated diacid having a carbon-carbon double bond is fumaric acid.
3. The composition of claim 2 wherein:
the saturated diacid is selected from diacids compatible with fumaric acid and poly(propylene fumarate).
4. The composition of claim 3 wherein:
the saturated diacid is selected from succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid and mixtures thereof.
5. The composition of claim 2 wherein:
the bioactive ceramic is hydroxyapatite.
6. The composition of claim 5 wherein:
the hydroxyapatite is grafted to the macromer by way of silicate groups.
7. The composition of claim 1 wherein:
the macromer is prepared by reacting the unsaturated diacid having a carbon-carbon double bond, the saturated diacid, and a silane coupling agent.
8. The composition of claim 7 wherein:
the unsaturated diacid having a carbon-carbon double bond is fumaric acid,

the saturated diacid is selected from diacids compatible with fumaric acid and poly(propylene fumarate), and
the silane coupling agent is a dihalodialkylsilane.

9. The composition of claim 8 wherein:

the saturated diacid is selected from succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid and mixtures thereof.

10. The composition of claim 7 wherein:

the macromer is prepared by reacting the unsaturated diacid having a carbon-carbon double bond, the saturated diacid, the silane coupling agent, and an ester of the saturated diacid.

11. The composition of claim 10 wherein:

the saturated diacid is adipic acid,
the silane coupling agent is a dichlorodimethylsilane, and
the ester is a monomethyl ester of adipic acid.

12. The composition of claim 10 wherein:

the bioactive ceramic comprises hydroxyapatite particles having a particle size of less than 10,000 nanometers.

13. A composition comprising:

a macromer including silane units, units derived from an unsaturated diacid having a carbon-carbon double bond, and units derived from a saturated diacid; and

a bioactive ceramic grafted to the macromer.

14. The composition of claim 13 wherein:

the macromer includes silane units, fumarate units, and units derived from a saturated diacid, and

the bioactive ceramic is hydroxyapatite.

15. The composition of claim 13 wherein:

the macromer includes silane units, fumarate units, and adipate units, and the bioactive ceramic is hydroxyapatite.

16. The composition of claim 13 wherein:

the bioactive ceramic is hydroxyapatite.

17. The composition of claim 16 wherein:

the hydroxyapatite is grafted to the macromer by way of silicate groups.

18. A biodegradable composite comprising:
 - (a) a polymeric matrix; and
 - (b) the composition of any of claims 1 to 17 crosslinked to the matrix.
19. The composite of claim 18 wherein:
the matrix has a carbon-carbon double bond.
20. The composite of claim 19 wherein:
the matrix comprises poly(propylene fumarate).
21. The composite of claim 18 wherein:
the composite is suitable as a scaffold for tissue regeneration.
22. The composite of claim 21 wherein:
the tissue is bone.

23. A crosslinkable, biodegradable material comprising:
a polymer having a carbon-carbon double bond;
the composition of any of claims 1 to 17, and
a crosslinking agent for crosslinking the polymer and the composition.
24. The material of claim 23 wherein:
the polymer comprises poly(propylene fumarate).
25. The material of claim 24 wherein:
the crosslinking agent is a free radical initiator.